KING COUNTY CONVEYANCE SYSTEM IMPROVEMENT PROJECT

NORTH CREEK STORAGE

FINAL MEMORANDUM

DECEMBER 1999

ACKNOWLEDGEMENTS

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TABLE OF CONTENTS

Page

LIST OF FIGURES

Figure **Page**

LIST OF TABLES

Table **Page**

INTRODUCTION

This purpose of this memorandum is to further develop the design criteria for the North Creek Storage Facility to be located in close proximity to the North Creek Pump Station. The facility site is flat and located in the middle of the Quadrant Business Park near Interstate 405 in Bothell. The site and North Creek Pump Station are shown on Figure 1.

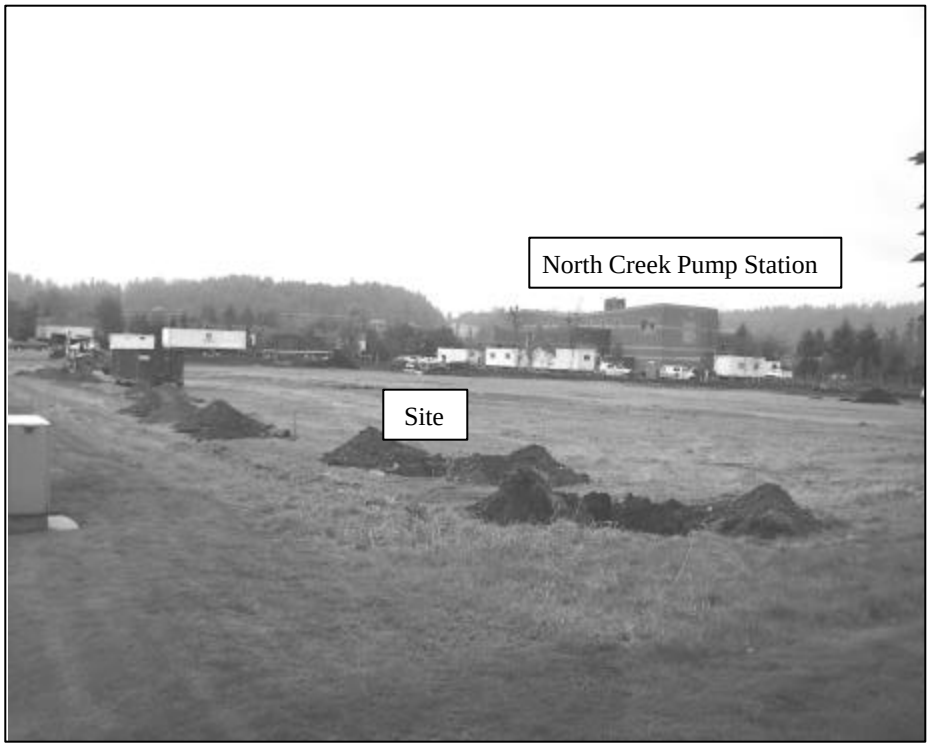

Figure 1: North Creek Storage Facility Site
Looking Southwest from the Northeast Corner of the Site

Under the current Regional Wastewater Services Plan (RWSP) agreement this facility is scheduled to be on-line by the end of 2002 to provide additional protection against overflows into Lake Washington upstream of the Kenmore Interceptor. This memorandum is not intended to solve all the issues for this storage facility but be a first step toward final design. There will be additional discussions during the course of predesign to resolve issues outlined in this planning study. A workshop session was held at HDR on October 19, 1999 to develop the design criteria for this proposed facility. The goals of the workshop were:

- Discuss design, operation, and maintenance issues regarding storage.
- If possible, reach an agreement on design criteria for these issues.
- Record issues that cannot be resolved for the final design consultant to address.

The meeting minutes from this workshop session are included in Appendix A.

DESIGN CRITERIA

As a result of this workshop session and other sources of information, design criteria were developed. Some issues were left unresolved while others will be further refined during final design.

System Hydraulics

Gravity conveyance should be used as much as possible to minimize the pumping costs and maintenance requirements for the storage facility. It is feasible to fill the storage basin by gravity, but some pumping will most likely be required to completely empty the storage basin. The physical constraints on gravity storage include the following:

- Minimum water surface elevation in the North Creek Pump Station wetwell: 108.0 feet.
- Maximum water surface elevation in the North Creek Pump Station wetwell: 114.5 feet.
- Elevation of overflow weir in the existing Diversion Structure: 114.50 feet
- Water surface elevation in Lake Washington: 113.5 feet (winter) and 115.5 feet (summer)

If the diversion structure were to be located adjacent to the North Creek Interceptor, upstream of the pump station diversion structure in the locations shown on the drawings in Appendix B, the maximum depth available for gravity storage would be approximately four feet. This gravity drainage depth could be increased by one to two feet if the diversion structure is connected to the 54-inch influent line to the North Creek Pump Station. A hydraulic profile for the storage facility and related conveyance components is outlined on Figure 2.

The capacities of the interceptors and pump station are:

- Capacity of the North Creek Interceptor: 29 mgd[1]
- Capacity of the Bothell-Woodinville Interceptor: 28 mgd
- Firm capacity of the North Creek Pump Station: 36 mgd

Based on these capacities, the peak flow though the storage facility diversion structure and to the storage facility is limited to 57 mgd, or 22 mgd if the North Creek Pump Station is operating.

It was suggested at the workshop that the firm capacity of the submersible pumps used to dewater the basin should be such that the storage facility can be dewatered in 12 to 24 hours.

[1] The capacity of the North Creek Interceptor will be exceeded in 2014 according to the trunk analysis included in *Wastewater 2020 Plus Conveyance and Treatment Alternatives Screening and Refinement*, January 1996.

Storage Volume

The recently adopted RWSP calls for the construction of 6 million gallons (MG) of off-line storage at North Creek by 2002. The RWSP also calls for the construction of 10 MG of storage in a new North Lake Interceptor in Kenmore. Therefore, the minimum storage volume for the facility is 6 MG. If the North Plant is not constructed until after 2010, additional storage will be valuable in the North Lake Washington area. Since this additional storage may prove useful, the feasibility of storing 14 MG at the North Creek site was also evaluated. With construction of storage in the North Lake Interceptor, the maximum useful storage volume at the North Creek site will probably be limited to 6 MG.

After the storage facility is constructed, the City of Bothell plans to construct a soccer field on the site. Due to the construction of this soccer field above the underground storage facility, it will be impractical to provide additional storage at the site once the facility is constructed.

With the construction of the North Treatment Plant, wastewater storage may no longer be required at North Creek. With this in mind, the facility should be constructed to allow future storage of reclaimed wastewater effluent for reuse.

Site Layout Restrictions

Future construction of a soccer field on top of the site implies a need to design the storage to minimize additional construction or maintenance activities that would disturb the soccer field. Therefore, siting of extra storage capacity must consider recreational use of the facility.

At this time, it is assumed that the soccer field will meet the minimum Federation International de Football Association (FIFA) requirements. The size of the field should be discussed with the City of Bothell Parks and Recreation Department who would construct, operate, and maintain the field. The minimum FIFA soccer field dimensions are depicted on the site drawings included in Appendix B.

Additional site layout restrictions include:

- High groundwater elevation (within 5 feet of the ground surface)
- Sensitivity of some nearby high technology facilities to vibrations from construction equipment.
- Need to restrict vehicle access to the field, especially the entrance road to the pump station. This entrance road must be kept clear at all times.
- Allow for vehicular access by the largest KCWTD boom truck.

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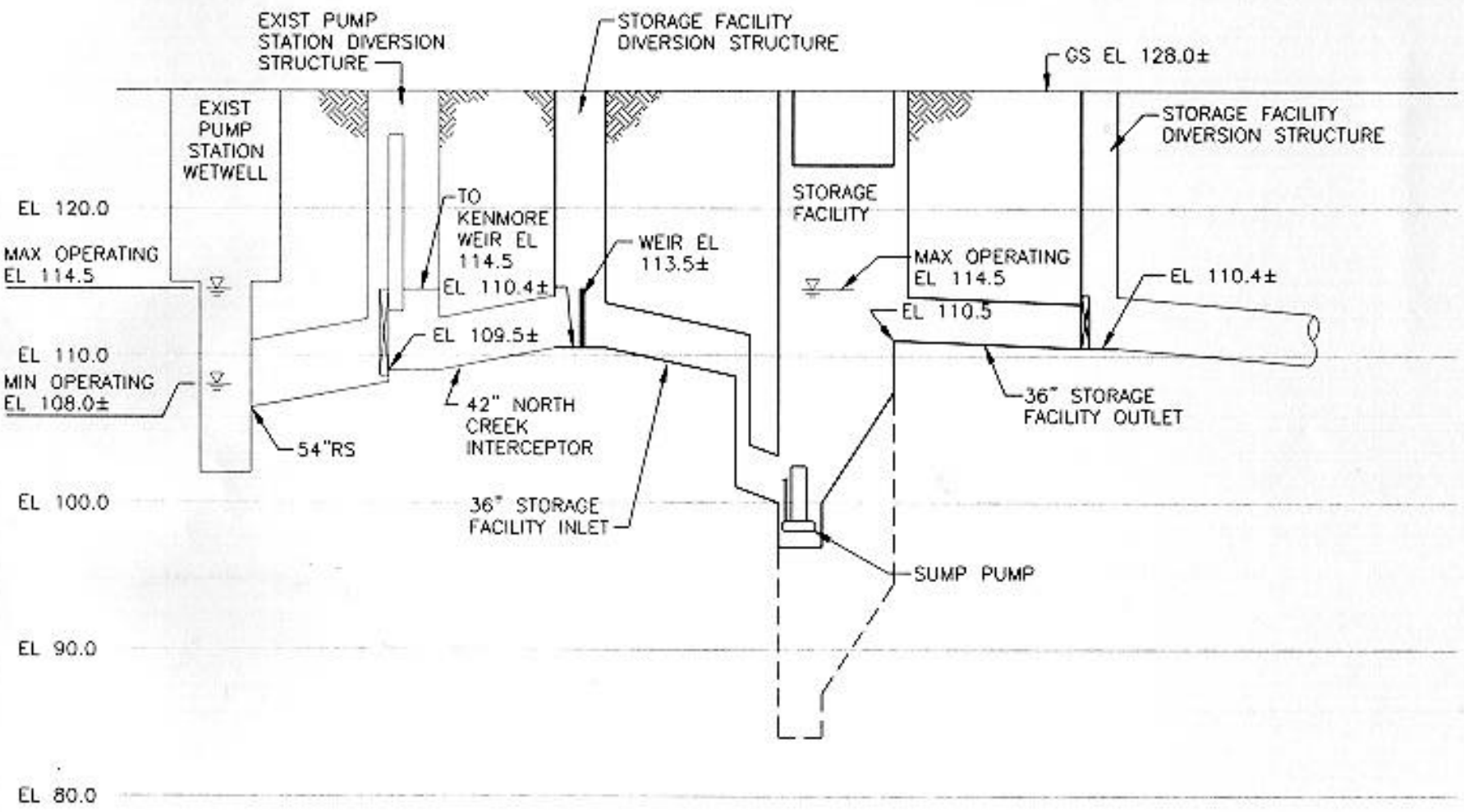


HDR Engineering, Inc.

Project Title
NORTH CREEK DIVERSION PROJECT
NORTH CREEK STORAGE FACILITY

Sheet Title
HYDRAULIC PROFILE

Figure No.
2

Date
DEC. 1999

Source

Diversion Structure

The diversion structure for the storage facility will probably be similar to the existing diversion structure for the North Creek Pump Station at the junction of the North Creek, and Bothell-Woodinville Interceptors. The storage facility diversion structure could be located either hydraulically upstream of the existing diversion structure on the North Creek Interceptor or hydraulically downstream on the 54-inch wetwell influent line.

The diversion structure should have a weir for normal operation and gates to control the flow of wastewater out of the storage facility and allow flow into the storage facility if desired. A weir inlet would minimize the quantity of solids entering the storage facility from the sewer and allow for passive activation of the storage facility.

Other design criteria discussed in the workshop session for the diversion structure include:

- Provisions for maintenance of gates and weirs
- Use of variable gates to assist in pacing outflows by both gravity and by pumping
- Use of selectable vs. open weirs to handle overflows
- Placement of the diversion structure to facilitate flows into more than one conveyance line (west or south)
- Locating the diversion structure and the return in the same structure
- Determine if wastewater should flow into the storage facility by gravity alone or via an operational decision
- Identify where relief needs to be provided in the conveyance system so that flows into and out of the storage facility can be controlled.

Access Requirements

Several access issues were discussed during the workshop session including the ease of entering and exiting the storage facility and strategic locations for fire hose connections and utilities. Given the different access philosophies, the workshop participants recommended that a subgroup be formed to examine access issues.

Discussion also included recommendations that any access lift slabs should be able to be moved by a boom truck and that driving access should be wide enough to accommodate these vehicles. In addition, access structures need to be designed for an HS-20 load.

Other design criteria discussed that are related to access include:

- "Kid-proof" access
- Preference for stairs (not spiral stairs) over ladders
- Access hatches large enough for skid loaders and adequate bottom floor width to accommodate such equipment
- Easily accessible first storage tank cell

- Separate access points for each compartment in the storage tank or access to a utilidor.

Washdown Facilities

There are a number of washdown technologies designed specifically for CSO storage facilities. Given the number and diversity of technologies, it was recommended at the workshop that a subcommittee be formed to evaluate the equipment available. These technologies include:

- Tipping troughs/buckets.
- Water cannons
- Flushing gates

A review of these technologies is included Appendix C.

Storage Facility Pump Station Criteria

Based on the discussion at the workshop session, the following criteria were developed for the storage facility pump station:

- Building the pump station underground may ease permitting the facility.
- Use fixed speed, submersible pumps
- Design capacity to dewater that portion of the basin not decanted by gravity in 12 to 24 hours and meet the capacity of the hydraulic cleaning requirements of the storage facility.

Odor Control/Ventilation

The design of odor control facilities and ventilation will be dependent upon the volume of the facility and access requirements. The King County Odor Control Task Force should be involved during final design to resolve the issues developed during the workshop session including:

- The frequency of ventilation: Continuous or intermittent.
- Ventilation required for corrosion control.
- Necessity of permanent odor control equipment.
- Type of scrubber: Activated carbon or compost biofilter.
- Determine if the existing activated carbon scrubbers at the North Creek Pump Station could be used.

For the 6 MG storage tank shown in Appendix A and a ventilation rate of 2 air changes per hour (ACH) for an empty facility and 6 ACH when the tank is full of wastewater, approximately 50,000 cfm would be required. To convey the air displaced by 57 mgd, the maximum feasible wastewater flow into the storage facility, a ventilation rate of approximately 5,300 cfm would be required.

Instrumentation, Controls, and Data Collection

Monitoring requirements discussed at the workshop session include:

- Water surface elevation in each cell of the storage facility.
- Water surface elevation upstream of the weir in the diversion structure.
- Potential level instrumentation includes bubblers and ultrasonic level detectors.

This level instrumentation should allow for monitoring the flow rate into and out of the basins as well as volume of wastewater stored.

Other parameters that may be monitored include:

- Dewatering pump operation and discharge rate.
- Rainfall data from the nearest rain gauge.

Control and instrumentation display should be available at the North Creek Pump Station and Renton Main Control.

Information on data collection and basin operation for CSO facilities in Michigan is included in Appendix D. The memo entitled "CSO Evaluation Plans Data Collection and Transfer Guide" may serve as the basis for data collection for the North Creek Storage facility. However, the data collection requirements for the North Creek Storage Facility are likely to be significantly less stringent since the facility will only be used for storage and not treatment.

Architecture

Any above ground structures associated with the storage facility should have a brick façade to match the exterior of the North Creek Pump Station. Potential above grade structures include the odor control facility and access structures to the storage facility. These facilities should be well clear of the soccer field.

Electrical and Lighting

Electrical feed could come from the existing North Creek Pump Station since the power requirements should be relatively small compared to those for the pump station. The size of the dewatering pumps, which will require the majority of the electrical load for the storage facility, is dependent upon the dewatering time, storage volume, and total discharge head on the pumps. Based on a maximum dewatering volume of 14 MG and on a dewatering time of 24 hours, and additional loads for lighting and ventilation, the approximate maximum electrical load for the facility would be 200 kW. For a smaller volume of 6 MG, the maximum electrical load would be reduced by approximately 80 kW.

Internal and external lighting will need to be resolved during final design. Unresolved issues include:

- The intensity of lighting inside each storage cell.
- NPFA rating of the storage cells as this relates to any ventilation system.
- Whether to have permanent external lighting or portable units.

Landscaping

Landscaping will need to meet the requirements of the Quadrant Office Park and will most likely be similar to the existing landscaping for the North Creek Pump Station.

Geotechnical Issues

The major geotechnical concerns for the storage facility include dewatering during construction and uplift forces on the storage structure. The groundwater level is within a few feet of the ground surface. Dewatering would require a cofferdam and wellpoints outside of the cofferdam to depress the local groundwater table. Protection against uplift could be accomplished with a combination of concrete mass, extended flanges on wall footings, and tension-uplift piles. In addition, no borings have been taken within the storage tank site, so borings will be required as part of the new foundation investigation for the storage tank.

OPERATION AND MAINTENANCE

The operation and maintenance (O&M) of the proposed facility was discussed during the workshop session since minimzing facility operation and maintenance costs and maximizing worker safety will need to be addressed during design of the facility. Two approaches to facility operation and maintenance were discussed:

- Design a facility for frequent access including ventilating the storage area at 12 ACH per hour and provide permanent lighting.
- Design the facility for infrequent access including lighting for safety purposes only and allow remote observation of the facility.

After discussion of the alternatives, it was agreed that a separate committee would be formed to examine O&M and evaluate how other municipalities have operated and maintained similar facilities. Appendix D includes papers on the operation and maintenance of CSO storage facilities. Since these papers were written, several municipalities have constructed CSO storage facilities with flushing gates and volumes greater than 1.5 MG. These municipalities include: Sarina, Ontario; Cheboygan, Michigan; Bidderford, Maine; Chattanooga, Tennessee; and Corvallis, Oregon.

In addition, personnel at Seattle Public Utilities were contacted to discuss their experiences with small CSO storage facilities. In general, SPU personnel recommended as simple a design as possible, especially no mechanical equipment, since it is difficult to maintain equipment in the storage facilities. From these discussions and subsequent review of SPU facilities, it was apparent that the facilities owned and operated by SPU are significantly different than the proposed North Creek Storage Facility and more relevant information on large storage facilities could be obtained from other municipalities.

Security

Security needs to be provided for this proposed storage facility similar to other KCWTD off-site facilities. Some of the security need and concerns identified at this time include:

- Padlocks
- Attention to grading around the facility, particularly access hatches
- Attention to avoiding attractive nuisances as much as possible
- Fencing, gates and other means to restrict access to the storage facility that will have to be discussed with the Quadrant Office Park

Access/Confined Space Requirements

The potion of the storage facility used to store wastewater will likely be classified as a permit required confined space according to Occupational Health and Safety Standard 1910.146. As such, suitable precautions and training will be required before personnel can enter the facility. Access should be designed to maximize worker safety regardless of regulatory requirements. Adequate ventilation will be required prior to personnel entering the facility. Given the size of the facility and only periodic access required, portable ventilation equipment should be considered.

Startup/Training Requirements

Typically, other municipalities have required at least 30 days of testing the facility and associated equipment prior to bringing the facility on-line. Since the storage facility will include permit required confined spaces, confined space training will be required for operation and maintenance personnel in addition to the standard KCWTD training for off-site facilities. In addition, it is recommended that the facility equipment be tested following maintenance and cleaning of the facility and prior to bringing the facility back on-line.

Operations and Maintenance Manual

The operation and maintenance (O&M) manual should be integrated with the North Creek Pump Station O&M manual since the operation of the two facilities will be so closely tied together. The manual should

also include more extensive information on the equipment in the facility since this equipment will only be operated periodically. During the workshop session, it was recommended that the manual emphasize clear communication between personnel inside and outside the facility when cleaning and maintenance operations are underway to ensure worker safety.

SUMMARY

Based on the workshop session and work to date, there are several design criteria that remain to be further developed as a part of the design process. The status of these design criteria are summarized in Table 1.

Table 1: Design Criteria

Criterion	Summary	Further Study / Information Needs
Hydraulics	Gravity in. Gravity out as much as possible.	Peak inflow and outflow rates. Confirm timing of North Creek Interceptor parallel.
Storage Volume	Minimum = 6 MG; Maximum = 14 MG. RWSP and North Plant dependent.	Storage Volume
Site Restrictions	Soccer field. No access within field. High groundwater. Safe clearance between any above grade structures and the soccer field.	
Diversion Structure	Overflow weir to minimize solids conveyed to storage facility and allow passive activation of the storage.	Location. Configuration once hydraulics are defined.
Access Requirements	Committee should be formed to evaluate alternatives.	Determine frequency and philosophy of access to storage area.
Washdown Equipment	Committee should be formed to evaluate alternatives.	Select system(s).
Storage Facility Pump Station	Location: All underground Pump type: Fixed speed submersible. Firm capacity: Dewater tank in 24 hours.	Storage/dewatering volume to size pumps.
Ventilation	Undecided	Determine air exchange rate.
Odor Control	Committee should be formed to evaluate alternatives.	Determine if odor control is required. Select system
Instrumentation and Controls	Monitor: Water surface elevation in each cell and diversion structure.	Type of equipment
Architecture/Landscaping	Any above grade structure should match the style of the pump station.	
Electrical and Lighting	Electrical feed from the NCPS.	Lighting in the tank. Type and intensity of external lighting.
Operation and Maintenance	Access issues unresolved.	Analyze the operation and maintenance of storage facilities similar to that proposed.
Geotechnical	Groundwater within a few feet of the surface. Storage facility will be built below peat and clay layers.	Multiple borings required to determine soils within storage facility. Additional borings required if odor control facility is required.

ALTERNATIVE EVALUATION

Conceptual level alternatives were developed based upon the findings of the workshop session and work to date. These alternatives include:

- A cast-in place rectangular basin to store 6 or 14 MG; and
- A number of parallel box culverts to store 6 MG. Parallel box culverts were evaluated in the conceptual design since 12-fott diameter pipes, the largest size available, could provide sufficient storage within the existing site constraints

In the future, this storage facility may no longer be required for wastewater storage. In this case, it would be possible to use the facility to store reclaimed wastewater for reuse. The design modifications provided to allow the storage tank to be used for reclaimed water storage and distribution in the future include:

- Inflow piping, pump discharge, and overflow piping.
- Provision for future reuse pumps. At this time, it was assumed four large, high head (>200 HP) vertical turbine pumps would be installed to pressurize the reuse water distribution system.
- The electrical and mechanical equipment associated with these pumps would be located below grade in the utilidor and mechanical area at the north end of the storage facility.

The conceptual design drawings for these alternatives are included in Appendix B.

Assumptions

Several design criteria are unresolved at this time. Therefore, several assumptions were made to provide a basis for the development of the conceptual design. These design assumptions include:

- The structure will be accessed infrequently. Personnel access and egress from the storage tank will be through hatches. For the storage tank alternative, buried concrete slabs have been provided with an opening large enough to accommodate a skid loader (Bobcat).
- A groundwater cutoff wall extending to about half again as deep as the excavation required will be constructed using sheetpile around the perimeter of the storage facility site. Dewatering wells around the sheet pile curtain will be used to dewater the site for construction of the tank. The dewatering system and sheet piles will be removed at the completion of construction.
- Where the weight of the structure and soil resistance are not sufficient to prevent flotation of the structure, auger cast tension-uplift piles would be used to resist the buoyant uplift force on the tank after construction is completed.
- For the storage tank alternative, the tank will be divided into four basins that will fill sequentially during a storm. For smaller storms when the tank is used strictly for storage, less than four basins may be required. This will minimize the maintenance and cleaning required of the tank at the end of the storm.
- Separate influent and outlet pipes with a minimum full-pipe capacity of 22 mgd will connect the storage facility to a diversion structure at the North Creek Interceptor.

- Pumps with a firm capacity to empty the storage facility in 24 hours will be provided.
- Flushing gates will be incorporated into each of the basins to facilitate cleaning and removal of settled solids. A small diameter pipe will be provided from the influent to the flushing gate reservoir to preferentially fill the reservoir first even in a small storm. The gates will be mounted in a six-foot wall at one end of the basin. When the basin is dewatered a small pool of water will be retained behind the wall. The flushing gate will open allowing a wave of water to move through the basin towards the sump and scour solids from the basin bottom. The wave will be contained within training walls.
- Washdown water will also be provided but the primary means of tank cleaning will be the flushing gates. The washdown water would be provided through a high-pressure water system and connections for fire hoses and water cannons.
- Tank access will be provided at several locations including over the submersible pumps.
- The tank will be ventilated to provide 6 ACH when the tank is full and about 2 ACH when empty.
- Specific odor control equipment is not recommended at this time.
- Minimal lighting will be provided inside the tank.
- Flow monitoring will not be included.
- Fire suppression equipment will not be included.
- To minimize the equipment that would need to be maintained in the storage area, mechanical cleaning equipment, such as chain and flight clarifier mechanisms were not included.
- Equipment such as submersible pumps and other items that will need to be accessed frequently by maintenance personnel have been located at the north end of the facility in or adjacent to the utilidor to avoid conflict with access to the North Creek Pump Station and soccer field.

These design criteria are preliminary. It is expected that these criteria will be revisited, discussed, and modified as a part of the design process.

PERMITTING

King County met informally with the City of Bothell (Bothell) to discuss permitting requirements. In this meeting, Bothell indicated they are considering the storage facility as Phase 2 of the North Creek Pump Station project and, therefore, land use issues resolved during the permitting process for the North Creek Pump Station would apply to the storage facility. Thus, no land use permits would be required for Phase 2. However, Bothell has determined that grading, building and right-of-way invasion permits will be required. In addition, dewatering/erosion control, traffic control, and fire issues will need to be addressed in the permitting process.

The project must comply with all codes listed in the Bothell Municipal Code and all fees identified in the current fee resolution adopted by the city council and applicable code. The Preapplication Memorandum prepared by Bothell provides additional detail on their expectations, a copy of which is included in Appendix C. A formal preapplication meeting will provide additional, specific permitting requirement details.

A Notice of Construction (NOC) will be required from the Puget Sound Air Pollution Control Agency (PSAPCA) since this project will potentially release malodorous gases. This permit should be filed at least 60 calendar days before construction.

SEPA Process

The State Environmental Policy Act (SEPA) Chapter 43.21C Revised Code of Washington requires all governmental agencies to consider the impacts of a proposal on the environment before making a decision related to the proposal. Many permit applications trigger the SEPA process and certain permits may not be issued until the SEPA process is complete.

A SEPA DNS was issued for the North Creek Diversion Project in July 1996. The environmental checklist for the project mentioned the possible addition of storage capacity at the project site. However the environmental checklist did not include any project details or address all the environmental impacts of the proposed North Creek Storage Project.

Two alternatives are available to satisfy SEPA requirements for the proposed project. The first is to prepare a new environmental checklist and issue a new DNS for the project. The second is to adopt and addend the July 1996 DNS for the North Creek Diversion Project. The addendum would add only new information related to the storage project. Much of the information in the 1996 documents is applicable to the storage project and would not need to be repeated. The public comment period for both alternatives would be 14 days.

SCHEDULE

A preliminary schedule was developed to design and construct a 6-MG storage facility. Based on this schedule, which is included as Figure 3, the project would include the following milestones:

Milestone	Date
Finalize Scope of Work	January 2000
Finalize Storage Volume	January 2000
Finalize Design Parameters	March 2000
50 Percent Design Complete	May 2000
100 Percent Design Complete	August 2000
Advertise For Bid	October 2000
Notice to Proceed for Construction	December 2000
Finish Construction	November 2002
Storage Facility On-line	January 2003

COSTS

Preliminary capital costs were developed based on the design criteria outlined above for the minimum and maximum storage volumes. These costs are summarized in Table 2.

Table 2: Opinions of Probable Cost (Seattle 1999 ENRCCI = 7000)

Project	Capital Costs (In Millions)			
	Storage Facility	Diversion Structure	Odor Control Facility	Total
Storage Basin – 6 MG	$25.7	$0.3	$1.5	$27.5
Storage Pipes – 6 MG	$30.7	$0.3	$0.9	$31.9
Storage Basin – 14 MG	$43.3	$0.3	$2.2	$45.8

Operations and maintenance (O&M) costs were developed from the following cost equation, the basis for which includes pumped dewatering of the facility, automated washdown, one inspection and maintenance visit per month, and a cleaning following each storm event. These assumptions are discussed in more detail in the memorandum in Appendix E.

$$\$ = (4{,}790 * \textit{storage volume in MG}) + (800 * \textit{number of events per year}) + 7{,}300$$

Based on this equation the annual O&M costs were calculated for a few recurrence intervals as summarized in Table 3 below.

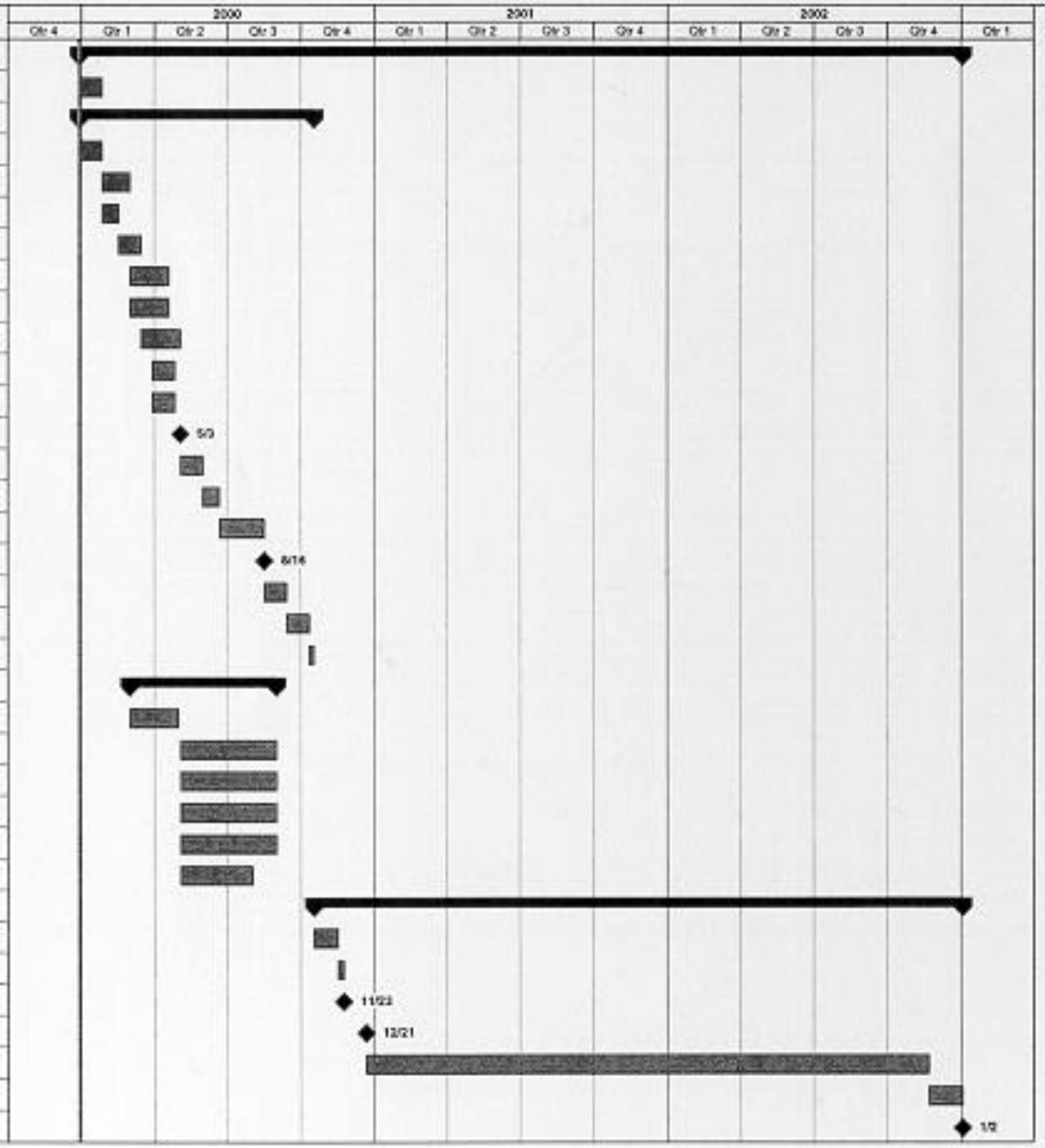
Table 3: Estimated O&M Costs (1999 Dollars)

Tank Size (MG)	Period Between Cleanings (Years)			
	1	2	4	5
6	$ 37,000	$36,500	$ 36,200	$ 36,200
14	$ 75,000	$75,000	$ 74,500	$ 74,500

KING COUNTY - NORTH CREEK STORAGE FACILITY

FIGURE 3

ID	Task Name	Duration	Start	Finish	Predecessors
1	**North Creek Storage Facility**	**786 days**	**Thu 12/30/99**	**Thu 1/2/03**	
2	Finalize Contract/ Scope of Work	20 days	Thu 12/30/99	Wed 1/26/00	
3	**Final Design**	**209 days**	**Thu 12/30/99**	**Tue 10/17/00**	
4	Finalize Storage Volume	20 days	Thu 12/30/99	Wed 1/26/00	
5	Finalize Design Parameters	25 days	Thu 1/27/00	Wed 3/1/00	2
6	Geotechnical Investigation	15 days	Thu 1/27/00	Wed 2/16/00	2
7	Geotechnical Report	20 days	Thu 2/17/00	Wed 3/15/00	6
8	Mechanical Design	35 days	Thu 3/2/00	Wed 4/19/00	5
9	Site Civil Design	35 days	Thu 3/2/00	Wed 4/19/00	5
10	Structural Design	35 days	Thu 3/16/00	Wed 5/3/00	7
11	Electrical Design	20 days	Thu 3/30/00	Wed 4/26/00	8SS+20 days
12	HVAC Design	20 days	Thu 3/30/00	Wed 4/26/00	8SS+20 days
13	50% Design Documents	0 days	Wed 5/3/00	Wed 5/3/00	8,9,10,11,12
14	VE Review of Design	20 days	Thu 5/4/00	Wed 5/31/00	13
15	Address VE Comments	15 days	Thu 6/1/00	Wed 6/21/00	14
16	Prepare 100% Design	40 days	Thu 6/22/00	Wed 8/16/00	15
17	100% Design Documents	0 days	Wed 8/16/00	Wed 8/16/00	16
18	Review of 100% Design	20 days	Thu 8/17/00	Wed 9/13/00	17
19	Incorporate Comments into Bid Documents	20 days	Thu 9/14/00	Wed 10/11/00	18
20	Print Documents	4 days	Thu 10/12/00	Tue 10/17/00	19
21	**Project Permits**	**131 days**	**Wed 3/1/00**	**Thu 8/31/00**	
22	SEPA Checklist	60 edays	Wed 3/1/00	Sun 4/30/00	5
23	City of Bothell Grading Permit	120 edays	Wed 5/3/00	Thu 8/31/00	13,22
24	City of Bothell Building Permit	120 edays	Wed 5/3/00	Thu 8/31/00	13,22
25	City of Bothell Right-of-Way Invasion Permit	120 edays	Wed 5/3/00	Thu 8/31/00	13,22
26	City of Bothell Construction Review	120 edays	Wed 5/3/00	Thu 8/31/00	13,22
27	PSAPCA Notice of Construction	90 edays	Wed 5/3/00	Tue 8/1/00	13
28	**Construction**	**577 days**	**Tue 10/17/00**	**Thu 1/2/03**	
29	Advertise for Bid	30 edays	Tue 10/17/00	Thu 11/16/00	20,26
30	Open and Evaluate Bids	5 days	Fri 11/17/00	Thu 11/23/00	29
31	Award of Contract	0 days	Thu 11/23/00	Thu 11/23/00	30
32	Notice to Proceed for Construction	0 days	Thu 12/21/00	Thu 12/21/00	31FS+20 days
33	Construct Storage Facility	700 edays	Thu 12/21/00	Thu 11/21/02	32
34	Acceptance Testing	30 days	Fri 11/22/02	Thu 1/2/03	33
35	Facility On-Line	0 days	Thu 1/2/03	Thu 1/2/03	34



Task | Progress | Milestone | Summary | Project Summary | Split

HDR ENGINEERING, INC